

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
24 March 2005 (24.03.2005)

PCT

(10) International Publication Number
WO 2005/026416 A1

(51) International Patent Classification⁷: **C25D 13/06**,
C09D 5/44, 201/00

(21) International Application Number:
PCT/JP2004/013696

(22) International Filing Date:
13 September 2004 (13.09.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2003-320274 11 September 2003 (11.09.2003) JP

(71) Applicant (for all designated States except US): **NIPPON PAINT CO., LTD.** [JP/JP]; 1-2, Oyodokita 2-chome, Kita-ku, Osaka-shi, Osaka 531-8511 (JP).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **KOJIMA, Yoshio** [JP/JP]; 950-3, Nakayamachonishi 2-chome, Nara-shi, Nara 631-0013 (JP). **YOSHIDA, Hitoshi** [JP/JP]; 8-1-102, Tsudamotomachi 2-chome, Hirakata-shi, Osaka 573-0127 (JP).

(74) Agents: **YASUTOMI, Yasuo** et al.; Chuo Bldg., 4-20, Mishinakajima 5-chome, Yodogawa-ku, Osaka-shi, Osaka 532-0011 (JP).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

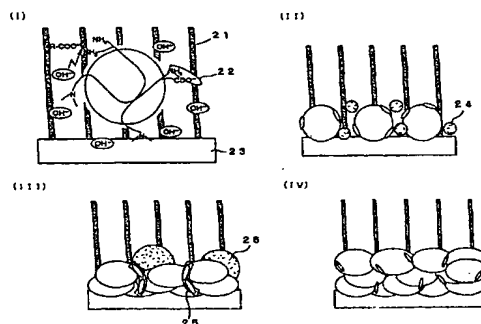
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD OF FORMING A CATIONIC ELECTRODEPOSITION FILM FORMING AN ELECTRIC THROUGH HOLE AND AN ELECTRIC THROUGH HOLE-FORMING CATIONIC ELECTROCOATING COMPOSITION



(57) Abstract: It is an object of the present invention to provide a method of forming a cationic electrodeposition film, which has no detrimental effect on basic performances of electrodeposition that a curing property in low temperature and the stability of pigment dispersion are good and basic performances such as corrosion resistance and a rust-preventive property are maintained while maintaining both surface smoothness and economical advantage and exhibits the extremely precise throwing power and can attain an excellent ability of preventing a pinhole due to gas. A method of forming a cationic electrodeposition film, comprising immersing an article to be coated, composed of a galvanized steel sheet, into a bath tank filled with a cationic electrocoating liquid containing a base resin and forming an electrodeposition film on the surface of the above galvanized steel sheet by current-carrying, wherein an electric through hole is formed within the above film to secure the conductivity of the above film in order to wipe out a spark discharge phenomenon arising due to the presence of a hydrogen bubble produced through cohesion of hydrogen gas, with the passage of time, generated by the above current-carrying at a gap of the film, which develops in depositing/forming the film by the above current-carrying and increasing its thickness with the passage of time, on the surface of the above galvanized steel sheet, and thereby an increase in an electric resistance value ($k\Omega \cdot \text{cm}^2$) per unit weight (mg) of the above film is inhibited.